IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

NOVOZYMES A/S, Plaintiff v. GENENCOR INTERNATIONAL, INC., and ENZYME DEVELOPMENT CORPORATION Defendants	C.A. No. 05-160-KAJ

PLAINTIFF NOVOZYMES' POST-TRIAL OPENING BRIEF ON DAMAGES

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Abbreviations and Citations In This Document

Citations are to numbered pages of the trial record, presented as an Appendix for the liability and damages phases of the case. Line numbers are indicated by a colon, e.g. **A5017:5-9** means lines 5-9 of page **A5017**. "**TE**" indicates a trial exhibit. **"DI"** indicates Docket Index. Emphases in quotations are added unless otherwise indicated.

I. STATEMENT OF FACTS

On August 24, 2006, this Court held that Genencor infringes claims 1, 3 and 5 of Novozymes' valid and enforceable U.S. Patent No. 6,867,031 for "Amylase Variants" ("the '031 Patent"). **A10066**. Novozymes has moved for a permanent injunction to preclude further infringement. **DI 169**. Novozymes has also moved to add its wholly owned U.S. subsidiary, Novozymes North America, as a party plaintiff in this action. **DI 144**.[1] These motions are pending.

On October 10-12, 2006 the Court held a bench trial on the issue of Novozymes' relief for Genencor's infringement. As shown at trial, Novozymes is entitled to recover damages of $20,365,465. Novozymes is also entitled to enhanced damages and attorneys fees, because Genencor's avid pursuit of Spezyme Ethyl was deliberate and willful patent infringement.

A. THE RISE OF LIQUOZYME AND THE FALL OF FRED

Before 1999, the fuel ethanol industry was a relatively small enterprise, in the nature of an entrepreneurial experiment in alternative energy sources. Since then, the industry has grown rapidly and continues to grow. In a series of steps, a crop such as corn is liquefied and converted into a viscous mash containing a high starch content, the starches are broken down into sugars, and these are converted to ethanol. **TE-228**, **A16002-3, ¶7-8.** Ethanol is increasingly important in the energy industry as an alternative or supplement to petroleum fuels. **A16003, ¶9; A15314:14-23**.

The breakdown of starches can be greatly facilitated by the use of an alpha-amylase enzyme in an early step of the process. **A1004-5, ¶4-5; A16002-3, ¶7-8**. The first alpha-amylases offered to the fuel ethanol industry were "wild-type" enzymes. These enzymes are produced from the gene of a naturally occurring organism, without using protein engineering to modify the gene and the resulting amino acid sequence of the enzyme. **A10024, ¶61**.

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[1] Novozymes A/S is a Danish corporation and owns the '031 patent. **A1003-4**. It sells patented alpha-amylase in the U.S. through its subsidiary, Novozymes NA. **A15106:13-15107:2; A15180:2-14.** A/S controls NA and all sales, profits and losses of NA belong to A/S. **A15010:7-15015:17, A15055:4-14, A15058:1-11, A15075:18-19, A15163:1-20**. The A/S core patents, including '031, are practiced exclusively in the U.S. by NA at the direction of A/S. **A15018:23-15019:7; A15034:17-15035:7; A15039:3-8**.

About 30 fuel ethanol plants were on-line in the U.S. by 1999. Novozymes and Genencor had alpha-amylase products to serve their needs. **A15112:21-15113:6**. Genencor was the market leader with Spezyme Fred (wild-type *B. licheniformis*). **A15090:19-15091:24**. Novozymes had about 20% of the market with its own wild-type enzyme. **A15092:8-15093:8; A15092:21-15093:1**. The G995/997 (wild-type *B. stearothermophilus*) was also available from Enzyme Biosystems ("EBS"), which Genencor acquired in 2002. **A15090:19-15091:24**.

In the mid-1990s Novozymes began looking for a way to use protein engineering to improve alpha-amylases for industrial use. The idea was to alter the amino acid sequences of wild-type enzymes to find variants with better properties, such as increased thermostability and reduced calcium dependence. **A10005, ¶6-7, A15089:14-15090:18**. This pioneering work was successful and led to several new alpha-amylases, which Novozymes described and claimed in a series of patent applications. The first was filed in Denmark in 1995. **A7002; TE-392, A16194**. International ("PCT") and U.S. applications were filed seriatim. ***Id.*** A continuation of the U.S. case followed, with the same specification and different claims. ***Id.*** This issued as U.S. Patent No. 6,297,038. ***Id.*** Another continuation led to the patent-in-suit, U.S. Patent No. 6,867,031. **TE-100, A7002**.

Novozymes chose to market a variant covered by claims of the '038 patent, and in 1999 it brought Liquozyme to the U.S. market. **A15093:9-18**. Among other benefits, Liquozyme has a much improved thermostability and requires much less calcium. **A15089:14-15090:18**. It was the first high performance alpha-amylase for the fuel ethanol industry. **A15093:24-15101:17, A15107:3-15109:24**. It is categorically superior to any alpha-amylase that came before, including Genencor's Fred and G995/997 products. ***Id.***

Liquozyme was a runaway success. It was the right product at the right time, in an industry poised for expansion and seeking ways to improve efficiency and yield. Customers quickly recognized its benefits and switched away from first-generation wild-type alpha-amylases to this new genetically engineered variant. **A15093:24-15095:11; A15100:2-15102:**1. Efficiency increased. Plants that had produced about a 12% yield of ethanol were able to increase yield to about 16%, in some cases 20%.

A15096:13-A15098:25. The number of ethanol plants grew to about 77 by 2005, and reached 100 by 2006. **A15112:12-15113:6**. Novozymes' market share rapidly grew from about 20% to more than 80% by 2004. **A15100:23-15102:1**.

Genencor admits it had no competing product. **A15181:3-15184:5, A15186:11-15187:13, A15193:19-15195:8, A15203:3-10; TE-230, A16018**. Spezyme Fred and G995/997 did not have the improved properties of Novozymes' patented variants, and were disfavored by customers. Fred "is not particularly well suited to mash liquefaction in fuel ethanol production" and "customers demanded an alpha-amylase product that was better suited for fuel ethanol production," **A15183:12-15184:4; TE-228, A16004**. As for G995 and 997, Genencor's sales director admitted, "I don't believe they had a lot of success in the marketplace." **A15187:6-13**.[2] Genencor was frantic for an alternative. **A15186:7-15187:3; TE-230, A16018**. It had no suitable alpha-amylase variant and attempts to develop alternatives failed; including efforts to improve the *B. licheniformis* alpha-amylase of Spezyme Fred. **A5037:15-5039:11**. It had no way to meet the demand for a super-charged product like Liquozyme, without infringing a Novozymes patent. **TE-230, A16018**.

B. THE RISE OF SPEZYME ETHYL AND THE FALL OF LIQUOZYME

Genencor's need led it to EBS and an alpha-amylase it called "EBS-1," sold as "Ultra-pHLo." **A15185:6-17**. Ultra-pHLo was a facsimile of Liquozyme, and Novozymes sued EBS for infringement of the '038 patent. Genencor acquired EBS while that suit was pending. **A15184:18-15186:6; TE-228, A16005-6**. Thereafter, Ultra-pHLo was discontinued and Novozymes settled the case. ***Id.***; **A150212-24; A15377:15-15378:17**. EBS-1 was no help to Genencor, because the furiously sought-after alternative to Liquozyme turned out to be a close copy of Liquozyme itself.

Unfortunately, Genencor turned from one infringement to another; from EBS-1 to EBS-2. EBS-2 is a 179,180 deletion variant of *B. stearothermophilus* alpha-amylase. **A15383:3-15384:17**. In April 2004,

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[2] *See also* **A5032:12-5039:11; A5046:14-21; A5048:13-5049:24; A15093:24-15102:1; A15107:3-15110:9; A15111:23-15112:10; A15181:3-15184:5; A15186:11-15187:13; A15203:3-10; A15089:14-15090:18; A15203:3-10**. (Old products like Fred et al. were inferior.)

Genencor launched EBS-2 as Spezyme Ethyl. **A15185:2-5; A15384:15-20**. It was selected for high thermostability and low calcium, to compete head-to-head with Liquozyme. **A1006¶V-X; A10023, ¶57; A14502; A15202:14-17, A15377:15-15378:17**. It was priced higher than Genencor's other alpha-amylases, with higher profits. **A15202:14-17, A15292:4-19**. But the price was lower than Liquozyme, the better to take customers from Novozymes. **A15295:9-23; TE-230, A16019**. Substantial price erosion was predicted. **A15197:24-15198:6; TE-230, A16019**.

The plan was to develop EBS-2 at all costs. Genencor was "disadvantaged by our lack of competitive AA [alpha-amylase] technology" and customers wanted "alternate purchasing options (to NZ) [Novozymes]." **TE-230, A16018**. It saw that "We maintain low market share in a product sector in which we once were the leader." ***Id.*** Its profit margin was "not sustainable;" it could not be "commercially aggressive in rebuilding market share" and needed "a more economical and technically viable product ...." ***Id.*** It saw that "investment in new, competitive technology is necessary in order to expand our market share for AA ethanol." ***Id.*** It saw that "Our existing AA enzyme technology, when applied to ethanol, is hampered by technical performance and economic issues – rendering us uncompetitive." ***Id.*** EBS-2 promised to address these issues (***Id.***):

> We must pursue EBS-2 and commercialization as our only viable short term option. This would enable us to regain a competitive position in AA products for FE [fuel ethanol] application.

Genencor was able to do all this with devastating effect. Spezyme Ethyl quickly gained ground against Liquozyme and Novozymes lost half the premium alpha-amylase market. **A15103:4-13**; **A15240:13-15241:20; TE485, A16630**. Spezyme Ethyl is an equivalent product at a lower price. **A15195:9-12; TE-230, A16019**. Like Liquozyme, Spezyme Ethyl is a preferred embodiment of the Novozymes patent specification that led to both the '038 and '031 patents. **TE100, A7001-7040; TE392, A16188-16229.** Novozymes was forced to drop prices and compete against itself, as if trading a commodity. **A15102:21-15103:3; A15553:12-15554:11**.

Genencor went ahead with Spezyme Ethyl, even though it knew about Novozymes' pending patent application, and even after it had a copy of the *allowed* '031 claims in September 2004. **A5014:4-**

14; A5663:16-5664:21. Novozymes sued the day the patent issued (**A1501, A7002**), but Genencor carried on, making infringement business as usual – until this Court intervened.

C. THE INFRINGEMENT HAS SEVERELY DAMAGED NOVOZYMES

Genencor's infringement began on March 15, 2005 when the '031 patent issued. In 2005 Genencor sold 3,372,163 kg of Spezyme Ethyl (March 15 - December 31, 2005). In 2006 it sold 3,621,081 kg of Spezyme Ethyl (January 1 - September 30, 2006). **TE-483, A16615-16, A16618, A16621, A16625; A15267:4-15268:3**; **TE-274A, A16056-57**. But for the infringement, Novozymes would have sold the same amount of Liquozyme. **A15103:4-13**; **A15256:14-21**.

Novozymes would reasonably have charged $3.43/kg in 2005 (**A15256:24-15257:5**) and $3.38/kg in 2006 (**A15257:2-23; A15452:9-20**). The lost sales in 2005 were 3,372,163 kg at $3.43/kg. or $11,566,520. The lost sales in 2006 were 3,621,081 kg at 3.38/kg or $12,239,254. **TE-487, A16634; TE-488, A16636**. This comes to $23,805,774. Novozymes' net profit margin was 74%. **A15268:5-15269:16**. Thus, the profit Novozymes would have earned, but lost to Genencor's infringement, was 74% of the total lost sales: $17,616,274. **TE-489, A16638**; **A15270:2-12; A15257:24-15258:9**; **A15268:5-15269:7; A15296:8-11**.

All of the lost sales and profits would reasonably have gone to Novozymes. This was a two-supplier market: Novozymes and Genencor. A lost sale by one went to the other. **A15103:4-13**; **A15256:14-21**. There was high demand for the patented product (**A15236:21-24**), which had an immediate "wow factor" (**A15094:1-3**) and categorically superior performance. **A10005, ¶3, 6-8; TE-100, A7009 at 3:65-4:9; A15181:3-19**.[3] It is stipulated that Novozymes could meet demand. **A14503-04; A15249:13-15250:2**. Novozymes also had the marketing capacity to make the lost sales. **A15252:3-7; A15251:20-25; A15123:23-23; A15125:6-25; A15252:3-7**. There were no acceptable substitutes to divert sales. **A10024, ¶58; A15182:6-22**. Spezyme Ethyl customers would not have turned from a high-

[3] *See also* **TE-392, A16195 at 3:62-4:6; A15094:8-15095:4; A15096:13-10597:6; A15098:8-10599:8; A15095:5-6; A15100:6-17; A15202:14-17**; **A15102:5-20; A15106:19-25**. (Patented variants, including Liquozyme, are superior.)

performance enzyme to a substantially inferior and outdated product like Fred or G995/997. **A15183:12-15184:4**; **A15107:3-24; A15109:25-15112:10**; **A15181:3-15184:5; A15203:3-10**. The "Johnny-come-lately" Spezyme Xtra was not available, is more costly, and is not a comparable premium product. **A15247:6-15248:16**; **A15530:24-15331:18; A15203:11-19; TE-447, A16232**. Xtra is a step back (**TE-298, A16068**), and there was nothing else to turn to. **TE-230, A16018**. The post-patent Ethyl sales were lost sales to Novozymes.

During the infringement, and because of it, Novozymes was forced to sell Liquozyme for less than the $3.43 and $3.38 prices it would have charged. The lost profit on Liquozyme due to this price erosion is the difference between the benchmark price and the actual price, multiplied by the kilograms sold. **A15297:19-A15298:21; TE492, A16644**. This was a loss of $2,693,104. ***Id.***

In addition to the fuel ethanol market, Genencor sold Spezyme Ethyl to some minor markets, for $701,082. **A15271:11-15272:13; TE-404A, A16230**. A fair royalty for these secondary sales is no less than 8%. **A15288:1-15289:5**.. This comes to $56,087. **TE-489, A16638**.

The total of these damages is $20,365,465. This will make Novozymes reasonably whole, and should be assessed against Genencor – plus pre-judgment interest.

Genencor made a preemptive, determined and on-going decision to infringe the '031 patent. It knew that Spezyme Ethyl is an infringing *B. stearothermophilus* alpha-amylase variant with the patented 179,180 double-deletion. **A15220:2--15222:1; A15383:3-15384:17; TE230, A16005-16006, ¶ 13**. It had no good faith belief that the patent is invalid. It professed a dubious hope that the claims would be found obvious over the Suzuki prior art. **TE230, A16005-16006, ¶ 13**. This ignored the superior unexpected results in the '031 patent and its file history. **A10053-10054**. It ignored that Genencor was counting on Spezyme Ethyl to compete with Liquozyme. **A15181:3-19**. It ignored that others, including itself, tried but failed to find another way. **A15185:14-15186:6; A15378:2-10**. It ignored that the patented product was a tremendous success; including that Genencor was profiting hugely at Novozymes' expense. **A15240:18-15241:20; TE485, A16630**. It ignored that Genencor actually thought the '031 variants were *patentable* over Suzuki. It said that they were patentable in its copycat patent application claiming the

same variants. **A6538:24-6540:7; TE202, A8532.44-8532.45**. Treble damages are appropriate in these predatory circumstances.

II. ARGUMENT

Novozymes is entitled to lost profits for Genencor's infringing sales of Spezyme Ethyl and for price erosion of Liquozyme. Novozymes is also entitled to a reasonable royalty for sales in markets outside the U.S. fuel ethanol industry. The damages should be enhanced because the infringement was willful. A permanent injunction should be ordered.

A. NOVOZYMES IS ENTITLED TO DAMAGES OF $20,365,465

A plaintiff-patentee who proves infringement is entitled to "damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer." 35 U.S.C. § 284. This statute "is expansive rather than limiting." *Rite Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1544 (Fed. Cir. 1995) (en banc). "It affirmatively states that damages must be adequate, while providing only a lower limit and no other limitation." *Id.* A reasonable royalty is "a floor," not the only form of compensation. *Id.* "Congress sought to 'ensure that the patent owner would in fact receive full compensation for 'any damages' … suffered as a result of the infringement." *Id.* at 1544-45 (quoting *General Motors Corp. v. Devex Corp.*, 461 U.S. 648, 654 (1983)). To be "adequate" the damages "should approximate those damages that will fully compensate the patentee for infringement." *Id.* at 1545.

The question is this: "had the Infringer not infringed, what would the Patent Holder-Licensee have made?" *Rite-Hite*, 56 F.3d at 1545 (quoting *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 377 U.S. 476, 507 (1964)). The "adequate damages" are the foreseeable losses of the patentee, "but for" the infringement – typically "the sales and profits lost to the patentee because of the infringement." *Rite-Hite*, 56 F.3d at 1545-46. Lost profits can be recovered whether or not the patentee's product is covered by the patent-in-suit. *Id.* at 1544-49.

Here, Genencor marketed the infringing Spezyme Ethyl product to compete head-to-head with the Novozymes Liquozyme product. Both products are patented by Novozymes; neither is patented by Genencor. Just as in *Rite-Hite*, 56 F.3d at 1546:

> Being responsible for lost sales of a competitive product is surely foreseeable; such losses constitute the full compensation set forth by Congress, as interpreted by the Supreme Court, while staying well within the traditional meaning of proximate cause. Such lost sales should therefore clearly be compensable.

Here, Novozymes has shown that, "'but for' the infringement it reasonably would have made the additional profits enjoyed by the infringer." *Micro Chemical, Inc. v. Lextron, Inc.*, 318 F.3d 1119, 1122 (Fed. Cir. 2003). "A patentee need not negative every possibility that the purchaser might have bought another product other than his absent the infringement." *Kaufman*, 926 F.2d at 1141. The issue "is not based on a subjective, individualized inquiry, but on an objective standard of 'reasonable probability.'" *Id.* A patentee can rely on "any method showing, with reasonable probability, entitlement to lost profits" and "[t]he Panduit and two-supplier market tests are recognized methods of showing 'but for' causation." *Micro Chemical,* 318 F.3d at 1122.

A widely accepted four-part test is articulated in *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156 (6th Cir. 1978). *See also*, *Rite-Hite*, 56 F.3d at 1545 (citation omitted); *Golden Blount, Inc. v. Robert H. Peterson Co.*, 438 F.3d 1354, 1371-72 (Fed. Cir. 2006). Under *Panduit*, a patentee must show: (1) demand for the patented product; (2) absence of acceptable non-infringing substitutes; (3) capability to exploit the demand; and (4) the profit it would have made. *See Golden Blount,* 438 F.3d at 1371-72; *Kaufman*, 926 F.2d at 1141 ("satisfaction of all four *Panduit* requirements compels us to find that it is reasonable to infer that the patentee probably would have made the sale but for the infringing sale.").

1. The Panduit Test

(a) The Patented Product Is In High Demand

Alpha-amylases are useful for catalyzing a chemical reaction that breaks starches into smaller molecules. **A10004, ¶4-5.** The alpha-amylases here are genetically engineered, high performance enzymes. They are much in demand, particularly for fuel ethanol production. **A15092:12-16; A15116:16-21**. They are prized for specially useful features, e.g. high thermostability without calcium. **A10005, ¶6-8.**

The patented products are far more efficient and cost-effective than traditional alpha-amylases. **A10005, ¶3, 8; TE-100, A7009 at 3:65-4:9**.

The first high performance alpha-amylase was Liquozyme, introduced by Novozymes in 1999. **A15093:9-23; A15093:9-15101:17, A15107:3-15109:24**. Liquozyme is covered by U.S. Patent No. 6,297,038. **TE-392, A16188-229**; **A15284:13-16**. The same important properties provided by the '031 patent are provided by the '038 patent and Liquozyme, including high thermostability and low calcium. **TE-392, A16195 at 3:62-4:6**. Before Liquozyme, Genencor dominated the U.S. fuel ethanol market with its Spezyme Fred and G995/997 products. **A15093:19-23**. These early enzymes are *not* genetically engineered; they are wild-type alpha-amylases. **A15091:22-24; A15365:15-15370:20**. They do not have the prized properties of Liquozyme, the '031 patent, and the '038 patent. **A15089:14-15090:18, A15181:20-15182:22, A15187:6-13, A15203:3-10.**

When Novozymes launched Liquozyme, "there was a wow factor with this enzyme. And in very short order, [the earlier products] were just progressively kind of wiped out." **A15094:1-3**. Liquozyme "took off" because "customers were seeing some real demonstrable differences" including a "viscosity reduction in their equipment process" to make a "more pulpable" mash. They could "add more corn, more grain … and therefore they could increase their throughput." **A15094:8-15095:4**. Efficiency was increased from 10-12% ethanol to 14-16%, up to as much as 20%. **A15096:13-10597:6**. In this growing market, customers realized they could use Liquozyme to run existing plants faster and at higher capacity to produce more ethanol. **A15098:8-10599:8**. Liquozyme "is able to handle high temperatures" and it can "perform for an extended time at high temperatures whereas other products typically had difficulty having a sustained performance at high temperatures." **A15089:17-24; A15095:5-6; A15100:6-17**. Low calcium was also desired, because it avoided a safety risk and avoided the costly and inconvenient need to address the buildup and removal of calcium scale from plant equipment. **A15089:7-13; A15089:25-15090:5**.

The market responded to these improvements. In 1999, before Liquozyme, Genencor dominated the U.S. market with its wild-type alpha-amylases. **A15093:19-23**. Novozymes had about a 20% share with its own wild-type enzyme. **A15092:21-15093:7**. By 2004 the market had flipped. Liquozyme

became an industry standard and "absolutely the dominant alpha-amylase." **A15101:1-5**. Because of Liquozyme, market penetration for Novozymes in that period was "around 80-some percent" in the dry mill ethanol business and reached as high as "86 percent." **A15101:18-A15102:1; A15092:8-9, A15093:2-8; A15101:18-15102:1**.

Genencor answered with Spezyme Ethyl. It has the same high performance properties as Liquozyme and is able to compete because of them. According to Novozymes' expert Julie Davis, "there is definitely a demand for the patented product." This demand "is related primarily to the benefits associated with the patented technology." **A15236:21-24**. When Spezyme Ethyl entered the market in April 2004 (**A14502**), "the consequence was that there was a product in the marketplace that had the same desirable properties, functionally that Liquozyme had .... [Spezyme Ethyl] had the same attributes, it was essentially the same product being offered at a much reduced price." **A15102:5-20**. Genencor, unable to sell its older alpha-amylases to customers demanding high performance, offered Spezyme Ethyl as a "me too" product, and sweetened the deal with aggressive pricing. As Novozymes' Mr. Faller explained (**A15106:19-25**):

> Well, I think what had happened since the introduction of Liquozyme in 1999, the industry, the customer base essentially had voted. They had made a mass exodus from the old technologies that were available and they moved to Liquozyme and with the appearance of Spezyme Ethyl, they now had another product of like performance, of identical performance ....

Genencor does not dispute that there was and is a great demand for these patented highly-thermostable alpha-amylase products, and that they have been enormously successful. Genencor admittedly had no competitive product and Novozymes became the dominant player – until Spezyme Ethyl. **A15181:3-19; A15182:6-22; A10024, ¶58**. Spezyme Ethyl, which by infringing, *is* the '031 patented product, has been sold to meet the customer requirements for high performance. It has been sold at a higher price and with a higher profit margin than garden variety alpha-amylase products. **A15202:14-17; A15292:4-19**. In dollars, Novozymes has sold more than $100 million of Liquozyme since 1999. **TE480, A16596-A16602**. In the approximately two years that Genencor sold Spezyme Ethyl, it made some $20 million in sales. **TE274A, A16056**. *See also* **A10024, ¶59**.

The "demand" prong of the *Panduit* test for lost profits has unquestionably been met.

(b) <u>There Are No Acceptable Non-Infringing Alternatives</u>

No one, including Genencor, has a non-infringing alpha-amylase which can match the performance of Novozymes' genetically engineered and patented alpha-amylases. The only acceptable alternative to Genencor's infringing Spezyme Ethyl is Liquozyme, a Novozymes product covered by a Novozymes patent.

Genencor's older products, Spezyme Fred and G995/997 are nowhere near acceptable non-infringing alternatives. Genencor admits that Fred is unsuitable. **A15183:12-15184:4; TE-228, A16004**. Genencor admits that G995/997 is a flop. **A15187:6-13**. These products are markedly inferior, with weak activity, poor thermostability, high calcium dependence, and low efficiency. **TE-230, A16018, 16022; n. 2** *supra*. As stated in *Standard Havens Prods., Inc. v. Gencor Indus, Inc.*, 953 F.2d 1360, 1373 (Fed. Cir. 1991), "[A] product on the market which lacks the advantages of the patented product can hardly be termed an [acceptable] substitute."

The old products also sell at a much lower price than Spezyme Ethyl (or Liquozyme) and generate much less profit. **A15202:14-17; A15292:4-19**. The market overwhelmingly rejected them in favor of the patented high performance alpha-amylases. From 1999 on, "they were virtually eliminated from the marketplace and the Liquozyme technology was used in its place." (**A15111:15-22**). "[O]n a sustained basis, the industry moved to Liquozyme. And when Ethyl became available it was Liquozyme and Ethyl." **A15110:14-25**. Spezyme Ethyl customers would not turn to Fred or any other available alpha-amylase product, except Liquozyme. **A15103:4-13**; **A15181:3-15187:13, A15193:19-15195:8, A15203:3-10; A15246:8-22**; **A15256:14-21**.

Genencor's last best hope is a post-Ethyl product called Spezyme Xtra. According to Genencor, "the plan is pretty simple (and ugly)." **TE-447, A16232**. Work on this stop-gap plan began in about June 2005, after Genencor's March 2005 infringement, and during this litigation. The first test sale was in June 2006, after the liability trial and just before the Court held Genencor an infringer. **A15194:9-25; TE-383, A16624**. In all it took at best 9-11 months to put the plan in place. **A15201:1-9; A15248:9-11**. Though

Xtra is apparently the best Genencor can do, it did *not* expect Xtra to be well accepted as a substitute for Spezyme Ethyl or Liquozyme. At the relevant time Genencor predicted at least 70% customer attrition and huge monetary losses. **A15195:22-2; A15197:5-16; -TE-447, A16232**. The effects of the changes occasioned by a switch to Xtra are not yet known, and do not bode well for Xtra. *See Micro Chemical*, 318 F.3d at 1123.

Xtra is uniformly recognized as inferior. **A15203:13-16; A15350:22-15351:17; TE-298, A16068**. It is essentially a high-dose and more costly version of the orphaned wild-type G995/997 alpha-amylase. **TE-447, A16232; A15203:2015204:8**. This is hoped to compensate for familiar shortcomings – low thermostability, high calcium, and low efficiency. **A15203:11-19; TE-447, A16232; A15203:20-15204:15**. It is *not* a high performance enzyme like Spezyme Ethyl or Liquozyme. **A15247:6-15248:16**. Xtra is significantly more costly than Ethyl and has lower profit margins. ***Id.*** So as not to be left with nothing, and as a hedge against litigation damages, Genencor is posturing to urge its Spezyme Ethyl customers to please try Xtra before switching to Liquozyme. **A15194:22-25; A15534:8-16**. Whether any customers really do so, and adopt Xtra as an acceptable long-term alternative, is unknown and unlikely. **A15530:24-15331:18.**

Spezyme Xtra is simply too little too late, as Genencor admits (**TE-298, A16068**):

> Our application data shows that this product [Xtra] is inferior to the current GMO[4] Spezyme Ethyl in regards to product performance. A launch of this product to the industry would be taking a step back as this enzyme would require an appropriate level of calcium to aid in its stability.

See also **TE-447, A16232**. Xtra plainly was not waiting in the wings, ready to stand in as needed. **A15247:6-15248:16; A15530:11-23**.[5]

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[4] GMO is an acronym for "genetically modified organism."

[5] Sales of old products to some less demanding buyers are not acceptable substitutes. *Stryker Co. v. Inter Medics Orthopedics, Inc.*, 96 F.3d 1409, 1418 (Fed. Cir. 1996). Fred, G995/997 and Xtra are inferior. **A10024, ¶58; A15107:3-24; A15530:24-15331:18**. Products that lack the specific advantages of a patented product "could hardly be termed acceptable substitutes." *Id.*; *see also Crystal Semiconductor*, 246 F.3d at 1356 (acceptable substitutes are not products "with disparately different prices or significantly different characteristics").

Xtra specifically was not a handy acceptable substitute under *Grain Processing Corp. v. American Maize-Products Co.*, 185 F.3d 1341, 1343-44 (Fed. Cir. 1999). *Grain Processing* warned specifically that its holding was limited to situations where an acceptable non-infringing substitute was so easy and forthcoming that it actually "was available" at the time infringement began, rather than only potentially or theoretically available. *Id.* at 1343: "Acceptable substitutes that the infringer proves *were available* during the accounting period can preclude or limit lost profits; substitutes only *theoretically possible* will not." A product that was not even considered until long after infringement began cannot have been an acceptable non-infringing substitute. "When an alleged alternative is not on the market during the accounting period, a trial court may reasonably infer that it was not available as a non-infringing substitute at that time." *Id.*[6]

Genencor cannot show that an alternative "was available" by speculating that some other product, e.g. Xtra, *might have been* ready sooner or is hoped to be deemed acceptable later. **A15247:6-15248:16; A15344:12-15**. "Mere speculation or conclusory assertions will not suffice." *Honeywell*, 166 F. Supp. at 1030. *See also Kaufman Co. v. Lantech, Inc.*, 926 F.2d 1136, 1142 (Fed. Cir. 1991) (alleged substitute that was "immature and more expensive than the patented technology during the time of infringement cannot have been an acceptable non-infringing substitute").

Genencor had at least five years from the time it confronted Liquozyme to come up with a non-infringing alternative – and failed. It tried to keep pace with its wild-type Fred and G995/997 products – and failed. It tried to modify Fred as an alternative – and failed. **A5037:15-5039:11**. It went from one infringing product (Ultra-pHLo) to another (Spezyme Ethyl). **A15185:14-15186:6; A10066**. It had no other product ready or even in mind that it thought could be an equivalent. **A15181:3-15187:13, A15193:19-15195:8, A15203:3-10; TE-230, A16018**. Only in response to high risk of losing this lawsuit

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[6] *See also Micro Chem.*, 318 F.3d at 1123 (distinguishing a two-week switch-over in *Grain Processing* from a four-month conversion and a lack of know-how about what to do); *Cordis Corp. v. Boston Sci. Corp.*, Civ. No. 03-027-SLR, 2005 U.S. Dist. Lexis 10749, *6 (D. Del. June 3, 2005) ("that a licensee could make a [non-infringing product] does not mean that there are non-infringing alternatives available on the market"); *Honeywell Int'l, Inc. v. Hamilton Sundstrand Corp.*, 166 F. Supp. 2d 1008, 1030 (D. Del. 2001) ("Technology which is still in development during the accounting period is not considered to be an available alternative.").

did Genencor hatch its "simple and ugly" plan to repackage an obsolete product in a higher dose as "Xtra." **A16232**. As in *Panduit*, 575 F.2d at 1162, n.9:

> the "acceptable substitute" element, though it is to be considered, must be viewed of limited influence where the infringer knowingly made and sold the patented product for years while ignoring the "substitute."

See also Stryker Co. v. Inter Medics Orthopedics, Inc., 96 F.3d 1409, 1418 (Fed. Cir. 1996).

No other company was or is present in the market. No one had a competing product on sale or on the horizon. In April 2005, a company called Valley Research announced a product called Ultra-Thin. It has not succeeded and is "of very little commercial significance." **A15117:15-15118:5; A15188:3-14**; **TE-298, A16064; TE-451, A16234**. In the field, it "did not perform very well" and "would cost the plants two to three times as much to use that product as it would to use Liquozyme or Spezyme Ethyl." **A15118:6-23; A15188:3-14**. Ultra-Thin is not an acceptable alternative, Genencor cannot even say it is non-infringing, and there is no evidence it was available to meet demand. **A15187:17-15188:2**; **A15243:22-15244:12; A15245: 11-21**. Noise about the possibility of a long-term future threat from China is even more remote. **A15244:13-15246:1.**

Expert Julie Davis thoroughly analyzed the fuel ethanol market, including sales trends for Spezyme Fred, Liquozyme, Spezyme Ethyl, and Spezyme Xtra, from 2003 through the third quarter of 2006. (Ethyl appeared in Q2 of 2004 and Xtra appeared in Q3 of 2006). **TE-485; A15237:115242:19**. She explained that the relevant market was Spezyme Ethyl customers, who would reasonably be expected to "want the same benefits and advantages that they had enjoyed when they were using Spezyme Ethyl." **A15243:3-6** Consequently, she "would expect them only to be happy with the Liquozyme product as an alternative." ***Id.***

Ms. Davis found that Liquozyme was on a rapid upward march until Spezyme Ethyl appeared. Then, Spezyme Ethyl took off and steadily increased. Liquozyme correspondingly lost ground, and recovered a bit when the market itself expanded. **A15240:2-21; A15241:14-20**. In contrast, sales of the old Spezyme Fred remained "a fairly stable number throughout … even after the introduction of Spezyme Ethyl." **A15241:21-15242:2**. Some customers "have purchased Spezyme Fred in the past and they

continue to purchase Spezyme Fred." **A15243:9-14**. "But for those who have converted over to Spezyme Ethyl, they presumably did so [because] they wanted the higher performance aspects of that product and now would want to continue to enjoy those attributes even if the Ethyl was no longer available to them." **A15243:14-18**. None of the products identified by Genencor were available and acceptable non-infringing substitutes. **A15249:9-12**.

The "no alternatives" prong of the *Panduit* test for lost profits has unquestionably been met.

(c) Novozymes Had Capacity To Meet the Demand

It is stipulated by the parties that Novozymes had the manufacturing capacity to supply its Liquozyme products to the entire market. **A14503-04; A15249:13-15250:2.**

Likewise, Novozymes had the marketing capacity to make the additional sales. **A15252:3-7**. Novozymes had already marketed Liquozyme to the entire industry, converting customers from older low performance alpha-amylases to its patented premium product, going from about 20% to as much as 86% of the market. **A15092:8-15093:8; A15092:21-15093:1; A15101:8-15102:1**. Novozymes and Genencor already compete for all of the sales to all of the same customers at the same ethanol plants and buying groups. Many are former customers that Genencor switched to Spezyme Ethyl by offering a lower price. **A15102:14-20; A15103:11-15104:1; A15404; A15195:9-12**. Marketing Liquozyme to the same customers, without competition from Spezyme Ethyl, would have been *easier*, and certainly no harder.

Novozymes also had personnel "that were already trying to reach out to each of these plants that were in the market over this period of time." **A15251:20-25**. This included the capacity to do large-scale plant trials. **A15111:1-11**. The sales force was large enough and growing. **A15123:23-23; A15125:6-25.** Technical personnel also work on marketing, and their ranks have grown as well. **A15127:9-24**. This was enough to meet demand and projected growth. **A15126:4-22; A15128:5-17.** Novozymes had the ability to sell Liquozyme instead of the infringing Spezyme Ethyl. **A15252:3-7**.

The "capacity" prong of the *Panduit* test for lost profits has unquestionably been met.

(d) Novozymes Suffered Quantifiable Damages

i. Lost Profits on Infringing Sales of Spezyme Ethyl

Novozymes has shown a "reasonable probability" that it would have made the lost sales and profits. *Rite-Hite*, 56 F.3d at 1545. Indeed Novozymes showed more: it very likely would have made those sales. The demand was there, Novozymes could meet it, and no substitute was available. Genencor was unable to show that its infringing sales would *not* reasonably have gone to Novozymes. *Id.*; *Golden Blount*, 438 F.3d at 1372. The lost profits can be quantified by determining the infringing sales of Spezyme Ethyl that reasonably would have gone to Liquozyme (the incremental sales volume), and subtracting the incremental costs of manufacturing and selling Liquozyme, to obtain the lost profits. **A15252:13-21; A15255:14-23**. *State Industries, Inc. v. Mor-Flo Industries, Inc.*, 883 F.2d 1573, 1579-80 (Fed. Cir. 1999) ("incremental profit . . . is well established and appropriate for determining damages for patent infringement").

Genencor provided its Spezyme Ethyl sales for 2004-2006. **A15267:4-15268:3; TE-483, A16615-16; A16618; A16621; A16625; TE-274A, A16056-57.** The infringement began on March 15, 2005 when the '031 patent issued. For every kilogram of Ethyl sold, a kilogram of Liquozyme would have been sold instead. **A15256:14-21**. Novozymes' price "would have been the same price that Novozymes charged [for Liquozyme] at the time that the patent issued. So that was $3.43 [per kg] in March of 2005." **A15256:24-15257:5**. A drop of 1.5% in 2006 would have been reasonable, making the price $3.38 in 2006. **A15257:2-23; A15452:9-20**.

The incremental sales volume is the kilogram amount of infringing Ethyl sold, multiplied by the price per kilogram that Novozymes would have charged for Liquozyme at the relevant time. The profit margin is the one Novozymes earned on Liquozyme in March 2005, before infringement, adjusted for costs. **A15268:5-15269:7**. This was 74%. **A15296:8-11**.[7] The profit on these sales is determined by applying the profit margin to the incremental sales volume. **A15257:24-15258:9**.

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[7] The on-going margin for Spezyme Ethyl was very similar: 71%. **A15269:12-16**.

Genencor sold 3,372,163 kg of Spezyme Ethyl to the U.S. fuel ethanol industry from March 15 through December 31, 2005. In a "but for" world, these would have been sales of Liquozyme at $3.43/kg – for a total incremental sales volume in 2005 of $11,566,520. At a margin of 74%, the lost profits to Novozymes in 2005 were $8,559,226. **TE-487, A16634.**

From January 1 through September 2006, Genencor sold 3,621,081 kg of Spezyme Ethyl. These would have been Liquozyme sales, at $3.38/kg -- for a total incremental sales volume in 2006 of $12,239,254. At a margin of 74%, the lost in 2006 were $9,057,048. **TE-488, A16636.**

Adding these figures together: $8,559,226 + $9,057,048 = $17,616,274. **TE-489, A16638; A15270:2-12.** This is the total lost profit amount Novozymes would reasonably have made, if Genencor had not used Spezyme Ethyl to infringe the '031 patent.

Genencor's Dr. Teece played with the numbers and made many hypothetical calculations. **A15494:2-15495:4; A15497:12-15499:23; A15506:9-15507:2; A15508:15-15509:3; TE-749, A16852.** He did not show what if anything from his menu would be reasonable. He did not show that Novozymes' calculations are unreasonable. For example, he relied on "competition that *could potentially*" occur, product "that was available *to come* into the marketplace." **A15449:11-14.** He relied on "that which is possible," and not on an actual ready-to-go product, as required. *Grain Processing*, 185 F.3d at 1343. He ignored the uncontested and very important technical differences between alpha-amylase products. **A15089:14-15090:18, A15181:20-15182:22, A15187:6-13, A15203:3-10.** He pointed to "the idiosyncratic needs" of some customers to justify discounting the infringing sales. **A15450:4-17.** But customer subjectivity is decidedly irrelevant. *Cordis Corp.*, 2005 U.S. Dist. Lexis 10749 at *6 (D. Del. June 3, 2005). Nor must the patentee show that every infringing sale would necessarily have gone back to him, in order to be compensated according to the reasonable expectation that, *objectively*, they likely would. *Id.* Even if some other calculation could also be reasonable, "Any doubts about the calculatory precision of the damage amount must be resolved against the infringer." *Kaufman*, 926 F.2d at 1141.

The lost profit Novozymes would have made is quantifiable and reasonable: $17,616,274.

ii. Lost Profits from Price Erosion of Liquozyme

Genencor's infringement forced Novozymes to reduce prices for Liquozyme. **A15553:12-15554:11; TE492A, A16646**. Novozymes can recover for this lost profit on its actual sales. *Crystal Semiconductor*, 246 F.3d at 1357 ("Reduction of prices, and consequent loss of profits, enforced by infringing competition, is a proper ground for awarding of damages.") (quoting *Yale Lock Mfg. Co. v. Sargent*, 117 U.S. 536, 511 (1886)). "To recover lost profits on a theory of price erosion, a patentee must show that 'but for' infringement, it would have sold its product at a higher price." *Ericsson, Inc. v. Harris Corp.*, 352 F.3d 1369, 1378-79 (Fed. Cir. 2003) (citing *BIC Leisure Prods., Inc. v. Windsurfing Int'l, Inc.*, 1 F.3d 1214, 1220 (Fed. Cir. 1993)).

Novozymes would have done so. **A15317:23-15318:3**. But for Spezyme Ethyl, Novozymes would have sold the same amount of Liquozyme at March 15, 2005 prices (when the patent issued), followed by a projected reduction of 1.5% on January 1, 2006. **A15297:10-18**. This price drop is a reasonable estimate of erosion from factors other than infringement, e.g. volume discounts to buying groups in a growing market. **A15339:21-15340:17**.

The market for alpha-amylase products is inelastic over the price ranges, sales volumes and time periods at issue. **A15535:22-15536:7** *See Ericsson,* 352 F.3d at 1379. If consumers no longer had a cheaper yet equivalent alternative to Liquozyme, they would have bought Liquozyme in the same quantities at its existing price. They would easily have paid $3.43/kg in 2005 and $3.38/kg in 2006. **A15535:22-15536:7; A15547:13-19; A15452:9-20**. As Ms. Davis explained, "It doesn't seem at all unreasonable to believe that the Spezyme Ethyl customers will pay the same amount the Liquozyme customers did. In fact, many of those Spezyme Ethyl customers, as we know, used to be Liquozyme customers, so they were buying it at that higher price." **A15536:18-25**. Novozymes prices would have held steady, and all the same sales would have been made.[8]

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[8] Dr. Teece said he could do many calculations with different parameters for different times, to come up with some 40 permutations for lost profits and 20 for price erosion. **A15506:2-18**. As an example he gave an arbitrary market elasticity of 1 which "knocks about 5 million off the lost profits (continued ...)

By analyzing the pricing over time for Liquozyme and Spezyme Ethyl, Ms. Davis found that before the '031 patent issued, the price of both products was relatively constant. **A15352:4-25; A15553:12-15554:11; TE492A, A16646**. After the patent issued, Novozymes was forced to lower its price in response to the infringement (***Id.***). Prices continued to erode over time. This post-patent price erosion is profit that Novozymes lost. **A15294:10-15296:24; TE-492A, A16646**. The amount can be calculated, month by month, by taking the difference between the benchmark price ($3.43 in 2005 and $3.38 in 2006) and the actual price, multiplied by the kilograms of Liquozyme sold. **A15297:19-A15298:21; TE484, A16628; TE492A, A16646**. This comes to $2,693,104. ***Id.***

iii. Reasonable Royalty for Infringement in Other Markets

All sales of Spezyme Ethyl infringed the '031 patent, but not all sales were made to the U.S. fuel ethanol industry. Some were made outside the U.S. or in other industries, such as the food and beverage industry. Novozymes is entitled to recover a reasonable royalty for these sales. **A15270:14-15271:10**. *Crystal Semiconductor*, 246 F.3d at 1354.

The infringing sales made to these markets totaled $701,082. **A15271:11-15272:13; TE-404A, A16230**. An appropriate royalty in these secondary markets is no less than 8%. **A15288:1-15289:5**. This is reasonable given the very small size of this market and the relative lack of information about it, compared to the U.S. fuel ethanol market. **A15270:14-A15271:13; A15287:22-A15289:21**. One 1995 license from Genencor to Novozymes provides some guidance for royalties in a 5-8% range for a less critical technology or market.[9] The upper end of this range (8%) is a fitting royalty to compensate

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number." **A15454:2-25**. Genencor of course would like to do that, but there is no basis for it. When asked "where should the number be?" Dr. Teece confessed ignorance. **A15454:11-25; A15498:24-15499:19; A15504:24-15505:3; A15506:19-15507:2**. While focusing on a theoretically impossible non-zero elasticity, he forgot the real-world. It is perfectly reasonable to expect that the price of the only premium product on sale would hold steady from March to December 2005, and then drop modestly for 2006. **A15535:16-15537:15**.

[9] Only this license was helpful. **A15319:16-22; A15325:9-25**. It concerned patents for the expression of proteins in Filamentus Fungi host cells. In 1995 the parties saw 5-8% as a baseline for that technology. **TE-339, A16120, A16125.** Those patents were less important than the '031 patent. **A15281:4-19**. By analogy, the 1995 license indicates a floor royalty in a very small market, where alpha-
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Novozymes for Genencor's 2005-2006 infringement in a minor market. Thus, the damages for this market is a $701,082 x 8%. **A15288:1-25**; **TE-489, A16638**. This come to $56,087.

2. Novozymes' Lost Profits to Genencor in a Two-Supplier Market

"The Panduit and two-supplier market tests are recognized methods of showing 'but for' causation" in a lost profits analysis. *Micro Chemical,* 318 F.3d at 1122. "In the two-supplier market, it is reasonable to assume, provided the patent owner has the manufacturing and marketing capabilities, that it would have made the infringer's sales." *Id.* at 1124 (quoting *State Indus., Inc. v. Mor-Flor Indus., Inc.,* 883 F.2d 1573, 1578 (Fed. Cir. 1989). A patentee must show: (1) that the relevant market contains only two-suppliers, (2) that it was able to make the sales diverted by the infringer, and (3) the profit it would have made from the diverted sales. *Id.* "In essence, the two-supplier market test collapses the first two Panduit factors [(demand and no alternatives)] into one 'two-suppliers in the relevant market' factor." *Id.*

The relevant market "excludes alternatives to the patented product with disparately different prices or significantly different characteristics." *Id.* (quoting *Crystal Semiconductor Corp. v. Tritech Microelecs. Intn'l, Inc.,* 246 F.3d 1336, 1356 (Fed. Cir. 2001)). The inquiry then "focuses on the number of companies involved, not the number of alternatives in the relevant market." *Id.* at 1124-25. When the patentee and the infringer are the only suppliers, a patentee who can meet demand and quantify its loss is entitled to fully recover – unless the infringer shows that diverted sales would not *reasonably* have been made by the patentee. *Id.* (citing *Kaufman Co., Inc. v. Lantech, Inc.*, 926 F.2d 1136, 1142 (Fed. Cir. 1991)).

Here, the relevant market is for high performance alpha-amylase in the fuel ethanol industry. **A15237:23-15238:14; A15242:23-15248:20**. Genencor's Spezyme Ethyl converted a one-supplier market in a superior one-of-a-kind patented product (Liquozyme), arduously developed by Novozymes, into a brutal two-supplier market. **A15106:9-25; A15110:18-24; A15180:2-15181:19; A15237:4-**

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amylase was not crucial. Contrast fuel ethanol, where the '031 patent is a core enabling technology in a large and growing primary market **A15280:4-19**; **A15016:12-15017:7; TE485, A16630**. The reasonable royalty in the key market is higher. *See* **§ II.B**.

15238:21; A15240:18-15241:20; A15242:23-15248:20; TE485, A16630. Genencor forced Novozymes and its patented high-end product into competition with Novozymes' *own* patented alternative, misappropriated and sold without compunction by Genencor, at a lower price. **A15102:14-20; A15103:11-15104:1; A15195:9-12; TE492A, A16646**. "But for" Spezyme Ethyl, Novozymes would reasonably have made 100% of the sales for highly thermostable alpha-amylase products in the fuel ethanol market. **A15248:21-15249:3; A15298:23-15299:20**. This is the likely outcome "with infringement factored out of the picture." *Crystal Semiconductor*, 246 F.3d at 1355 (quoting *Grain Processing Corp. v. American Maize-Products Co.*, 185 F.3d 1341, 1350 (Fed. Cir. 1999)); *Ericsson, Inc. v. Harris Corp.*, 352 F.3d 1369, 1377 (Fed. Cir. 2003).

In this two-supplier market, just as under the *Panduit* test, Novozymes would reasonably have made all of Genencor's sales of Spezyme Ethyl.

3. The Total Damages Are $20,365,465

Both the *Panduit* and two-supplier tests has been met. As in *Kaufman*, 926 F.2d at 1141, "when the fact situation compels the reasonableness of the inference [of lost profits] via both courses, the inference approaches conclusiveness." Here, the patented product is in demand, Novozymes can meet that demand, there is no acceptable alternative, and the lost profits are quantifiable. As shown above, Novozymes should recover damages in the amount of $17,616,274 for lost profits, plus $2,693,104 for price erosion, plus a reasonable royalty of $56,087 for infringing sales outside the U.S. fuel ethanol market. This comes to a total of $20,365,465 – plus prejudgment interest. **A15301:22-24; A15540:12-23; TE484, A16628**.[10]

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[10] Genencor argued that Novozymes would have kept no more than 83% of the market in a "but for Spezyme Ethyl" world. **A15444:12-15445:9**. Novozymes disagrees, for all of the reasons given at trial and in this brief. Still, an alternative calculation on 83% of the infringing sales can be done, and comes to $14,621,506. A reasonable royalty of 25% would be due on the other 17% of infringing sales, which comes to $856,927. **A15341:13-15342:2**. The 8% royalty for other markets remains $56,087. Price erosion on actual sales of Liquozyme also is the same at $2,693,104. This results in a total of $18,227,624. **A15299:15-15301:6**; **TE-493, A16648**.

B. ALTERNATIVELY, THE MINIMUM REASONABLE ROYALTY IS 25%

A prevailing patentee is entitled at least to a reasonable royalty for infringement. 35 U.S.C. § 284. "The royalty may be based upon an established royalty, if there is one, or if not, upon the supposed result of hypothetical negotiations between the plaintiff and defendant." *Rite-Hite*, 56 F.3d at 1554. "The hypothetical negotiation requires the court to envision the terms of a licensing agreement reached as the result of a supposed meeting between the patentee and the infringer at the time infringement began." *Id.* "Factors relevant in a reasonable royalty determination using this method include those set out in *Georgia-Pacific*." *Micro Chem., Inc. v. Lextron, Inc.*, 317 F.3d 1387, 1393 (Fed. Cir. 2003); *Georgia-Pacific Corp. v. United States Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *aff'd*, 446 F.2d 295 (2d Cir. 1971). A royalty should be recovered on all sales for which lost profits are not available. *Crystal Semiconductor*, 246 F.3d at 1354.

To determine a reasonable royalty, expert Davis examined relevant documents of the parties and interviewed witnesses. **A15232:15-15233:18**. She considered the guidelines in *Georgia Pacific*, 318 F. Supp. at 1120. She studied other licenses, and focused on a hypothetical negotiation between a willing buyer and seller at the relevant time. *Id.* **A15276:20-15279:2**.

For the '031 patent, Genencor and Novozymes are in a two-supplier market. Sales by Genencor are a loss for Novozymes. This indicates a substantial royalty. **A15282:14-15283:2**. The patented product is very profitable, with a predictable 74% margin for Novozymes and 71% for Genencor. This also indicates a substantial royalty. **A15283:25-15284:7**. The products have distinct technical and commercial advantages attributable to the patented technology, so the royalty would be substantial. **A15285:2-15286:21**. Genencor made extensive and very successful use of its infringement, showing the value of the patent and the expectation of a substantial royalty. No acceptable alternative was available, so again the royalty would be substantial. **A15106:9-25; A15110:18-24; A15180:2-15181:19; A15237:4-15238:21; A15240:18-15241:20; A15242:23-15248:20; A15350:22-15351:17; TE485, A16630**. Novozymes does not license core technology, except in very special circumstances. **A15016:1-15017:13; A15281:20-15282:13; A15320:8-22; A15353:1-25**. This too indicates a substantial royalty. The hypothetical

negotiator would also have seen price erosion as prompting a substantial royalty. "Novozymes would be looking for some sort of compensation to make sure that they were not losing more than the sale itself." **A15334:3-12**.

In the licensing business, a "rule of thumb" can be used to estimate a reasonable royalty as a rate between 1/4 and 1/3 of the profits attributable to the invention. Since the profit margin for Spezyme Ethyl was 71%, the corresponding royalty ranges from 18-24%. **A15290:3-15291:14**.

The reasonable royalty can also be quantified analytically as a rate that would account for the difference between the profit margin on the patented product and a typical margin for the business, i.e. for an unpatented product. **A15291:15-25**. *TWM Mfg. Co. v. Dura Corp.*, 789 F.2d 895, 899-900 (Fed. Cir. 1986). For the hypothetical negotiator, the on-going and expected future margin for Spezyme Ethyl was 71%. **A15290:14-15291:11; A15332:24-15333:16**. Genencor's next best product, and the only real benchmark, was the unpatented Spezyme Fred. **A15292:1-19**; **TE-491, A16642**. (Spezyme Xtra is not a proper benchmark. **A15247:6-15248:16**; **A15530:24-15331:18; A15203:11-19; A15293:3-15; TE-447, A16232**). The margin for Fred was 44%. **A15292:1-19**. The difference between these margins is 71-44 = 27%. ***Id.***[11]

These approaches yield a royalty of 18-27%, and support each other at the top of the range. In the totality of circumstances, a rate near but less than the top of the range would have been the right compromise and a fair royalty for the '031 invention. A 25% royalty would be a reasonable minimum to compensate Novozymes, "while still leaving Genencor with a significant margin." **A15292:20-15293:2**. Genencor would still have made more (71-25=46%) than it did on Spezyme Fred (44%). **A15292:1-15293:2; A15551:4-15552:10**.

If a royalty is assessed for any infringing Spezyme Ethyl sales to the U.S. fuel ethanol market, 25% is the right number to compensate Novozymes as the minimum in appropriate damages for

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[11] This is a conservative approach. It relies on a lower profit margin for the patented product (71% for Ethyl, not 74% for Liquozyme) and a higher profit for the unpatented benchmark (44% for Fred) rather than the less profitable G995/997.

Genencor's infringement. 35 U.S.C. § 284. This rate should be applied to the portion of Genencor's U.S. sales of Spezyme Ethyl that are not recoverable as lost profits (if any), as adjusted for the 10% discount Genencor gives to its distributor, EDC. **A15293:16-15294:8.**

If all U.S. sales of Spezyme Ethyl are subject to the 25% royalty, the total would be $5,096,780, plus the lower royalty for secondary sales of $56,087, for a total of $5,152,867 -- plus interest. **A15374:4-15378:21.**[12]

C. NOVOZYMES' CORPORATE STRUCTURE DOES NOT BAR LOST PROFITS

As a multinational corporate enterprise, Novozymes uses locally incorporated subsidiaries to most efficiently operate under local laws and regulations in jurisdictions throughout the world. **A15014:4-11.** Novozymes A/S, the Danish parent, owns the '031 and '038 patents, controls NA (its wholly owned U.S. subsidiary), and coordinates all activities concerning the patents, the fuel ethanol industry, and the manufacture and sale of Liquozyme. **A15010:9-15020:23.** Novozymes sells Liquozyme in the U.S. through NA, and is entitled to recover lost profits, whether or not NA is a named party. Additionally, NA has standing in this action as a co-plaintiff because of its unequivocal implied exclusive license from A/S. **A15017:13-15019:14, A15022:7-17.** To avoid ambiguity and conform the pleadings to the evidence, NA can and should be joined as a co-plaintiff.

1. Novozymes A/S Can Recover Lost Profits Through Its U.S. Subsidiary

Upon a finding of infringement, a court must award full compensation for the loss. 35 U.S.C. §284; *General Motors*, 461 U.S. at 654. Multinational corporate patentees like Novozymes are not required to arrange their internal structures specifically to be eligible for full compensation, e.g. lost profits. "When Congress wished to limit an element of recovery in a patent infringement action, it said so explicitly." *Id.* at 653. *See also, Rite-Hite,* 56 F.3d at 1544-45; *Kalman v. Berlyn Corp.*, 914 F.2d 1473, 1482 (Fed. Cir.

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[12] To apply a different rate, or to apply the royalty to less than all sales, the selected rate would be multiplied by Genencor's Spezyme Ethyl revenue in dollars, for the affected sales. This can be derived from **TE-483** and adjusted for the 10% discount granted by Genencor on sales by its distributor (EDC). **A15271:16-15272:13; A15347:4-15348:12; TE483, A16610-16627.** Based on Genencor's figures, Ms. Davis calculated a 25% royalty of $5,096,780, which corresponds to a total sales volume of $5,096,780 / 0.25 = $20,387,120. **A15347:4-15348:12.**

1990) (ordering lost profits on sales by inventor-patentee's closely held corporation to effectuate "principles of equity" and "Congressional mandate" of adequate compensation); *WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1361 (Fed. Cir. 1999) (ordering lost profits on sales lost by wholly owned subsidiary); *Union Carbide Chems. v. Shell Oil*, 425 F.3d 1366, 1377-78 (Fed. Cir. 2005) (lost sales of products by patentee's parent must be included in damages). As these precedents show, Novozymes' use of a subsidiary to conduct its business in the U.S. does not bar a recovery of damages that would "fully compensate" it.

The infringer is responsible for lost profits when the injury was or should have been reasonably foreseeable by an infringing competitor in the relevant market. *Rite-Hite*, 56 F.3d at 1546. Whether Novozymes nominally sells Liquozyme though A/S or NA, the loss of such sales to Spezyme Ethyl was foreseeable. For example, the fuel ethanol market is and has been a two-supplier market: Novozymes and Genencor. **A15106:13-15107:2; A15180:2-14**. *See also* § **II.A.2**. They compete for the same customers and supply contracts. **A15123:23-15126:22; A15251:16-15252:2**. Genencor knew and intended that every sale of Spezyme Ethyl would be a lost sale of Liquozyme. **TE-230, A16018; A15102:5-15104:1, A15123:23-15126:22; A15251:16-15252:2.** It was not just reasonably foreseeable, but entirely obvious, that Genencor's sales of Spezyme Ethyl would mean lost profits by Novozymes. **A15106:13-15107:2; A15236:1- 15241:20; A15242:25-15243:6; A15248:12-15249:12; A15019:15021:24**. There is no confusion about who lost the sales. The Novozymes corporate structure is not an escape for Genencor nor a balm for its infringement.

Full recovery of lost profits is also proper because Novozymes A/S and NA act as one entity. *Kalman*, 914 F.2d at 1482; *WMS Gaming,* 184 F.3d at 1361; *Union Carbide,* 425 F.3d at 1377-78 (Fed. Cir. 2005). Operationally, they act as a single unit in the manufacture, marketing, and distribution of Liquozyme to the U.S. fuel ethanol market. **A15010:7-15014:11**. Four of the five NA directors are employees of A/S. **A15014:12-15015:17, A15163:1-6.** A/S sets the strategy through an industry strategy group headed in Denmark by A/S personnel. **A15010:7-15014:11; A15163:7-20**. NA implements that strategy under the supervision, direction, and control of A/S. ***Id.***

Financially, A/S and NA act as a single unit in dealing with the profits and losses arising from the sale of Liquozyme. **A15054:16-15056:20**. A/S owns 100% of the stock of NA and thus also owns all of its assets and liabilities. **A15011:3-8, A15160:25-15161:3.** A/S consolidates the profits and losses of all of its subsidiaries, including those of NA, into its own financial statement, upon which the stock of A/S is publicly traded. **A15055:25-15056:21; A15058:1-11; A15163:24-15165:6; A15166:3-15167:12**. Thus, a dollar earned by NA is a dollar earned by A/S, and a dollar lost by NA is a dollar lost by A/S. **A15166:3-15167:12**.

NA and A/S also act as one unit with respect to their intellectual property. A/S holds title to the patents, including the '031 Patent covering Spezyme Ethyl and the '038 Patent covering Liquozyme. **A15017:8-15018:14, A15022:7-17**. A/S does not out-license its core technology, which includes these patents. **A15015:19-15017:13**. It makes and sells product in the U.S. under these patents directly and only through NA. NA has an implied and *de facto* exclusive right, which allows Novozymes to compete most effectively in this market. **A15017:13-15019:14; A15022:7-17**. There is no agreement that expressly sets forth the grant of these exclusive rights, because it was not necessary to do so. **A15024:16-15035:7, 15038:18-A15039:8**.

It has been abundantly clear to Genencor that A/S and NA act as one. Genencor sought and was given full access to documents and witnesses from both A/S and NA. **A1147; A1164-1221**. At the preliminary injunction stage, the parties argued over whether the harm suffered by NA was irreparable. (**DI 17, 25, 40, 50, 59**). During both trial phases, both sides elicited testimony from A/S and NA witnesses and submitted A/S and NA documents as trial exhibits. **A1147, A1164-A1221**. Everyone in the fuel ethanol business and throughout this lawsuit consistently treats A/S and NA as one entity: Novozymes. **A1147, A1164-A1221; A15010:7-15014:11**.

2. Novozymes NA Should Be Added As A Party-Plaintiff

On July 25, 2006 Novozymes A/S moved under Rules 15(a) and 21, seeking to add NA as a co-plaintiff. **DI 144-47**. This was after the deadline in the scheduling order, and triggered a showing of "good cause" under Rule 16(b). **DI 145-47, 152-54, 157-58, 162, 165-66, 174-75**. The Court denied the motion

without prejudice. **DI 178**. This was to allow Genencor further discovery. **DI 182, 23:2-17**. The Court also asked for evidence on NA's standing under *Kalman* and *WMS Gaming*, so that the issue could be decided "on a full evidentiary record." ***Id.*** Novozymes did so and renewed its motion at trial. **A15003:14-A15006:6**. The record confirms that NA has standing to join this lawsuit as a co-plaintiff. Novozymes' course of conduct shows that NA is a *de facto* exclusive licensee of the '031 and '038 Patents.[13]

"Under certain circumstances, a licensee may possess sufficient interest in the patent to have standing to sue as a co-plaintiff with the patentee." *Rite-Hite,* 56 F.3d at 1552-53. As in *Waterman v. Mackenzie*, 138 U.S. 252, 255-56 (1891), "[a]ny rights of the licensee must be enforced through or in the name of the owner of the patent, and perhaps, if necessary to protect the rights of all parties, *joining the licensee with him as a plaintiff.*" Thus, the need and right to join a party such as Novozymes NA has long been recognized. The co-plaintiff is usually a licensee, and "[s]uch a licensee is *usually* an 'exclusive licensee.'" *Id.* at 1552. A co-plaintiff in essentially the same shoes as the patentee has standing, even if not a traditional exclusive licensee. *WMS Gaming*, 184 F.3d at 1361 (wholly owned subsidiary had standing without mention of a license); *Kalman*, 914 F.2d at 1481 ("sole licensee" had standing); *Ricoh Co. v. Nashua Corp.*, 947 F. Supp. 21, 23-24 (D.N.H. 1996) (citing *Kalman;* manufacturing subsidiary had standing through implied exclusive license).

Course of conduct controls, not semantics in corporate documents. Thus: "use of the word 'exclusive' is not controlling; what matters is the substance of the arrangement." *Textile Productions, Inc. v. Mead Corp.*, 134 F.3d 1481, 1484 (Fed. Cir. 1998). As in *Ortho Pharmaceutical Corp. v. Genetics Inst.*, 52 F.3d 1026, 1032 (Fed. Cir. 1995):

> It is the licensee's beneficial ownership of a right to prevent others from making, using or selling the patented technology that provides the foundation for co-plaintiff standing, not simply that the word 'exclusive' may or may not appear in the license.

Courts look for an "express or implied promise" by the patentee to the licensee "that others shall be excluded from practicing the invention within that territory." *Rite-Hite*, 56 F.3d at 1552; *see also Textile*,

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[13] Other reasons to add NA as a party are already briefed. e.g. diligence, balance of harm, and amending the pleadings would conform them to the evidence. **DI 145, 152, 165, 174.**

134 F.3d at 1484 (licensee's standing is proper where "the patentee has promised, expressly or impliedly, that 'others shall be excluded from practicing the invention' within the field covered by the license."). The relationship and conduct between Novozymes A/S and NA demonstrates plainly that all others were and will be excluded from practicing the '031 Patent.

As stated in *Kalman*, 914 F.2d at 1481-82 (citations omitted):

> When the sole licensee, however, has been shown to be directly damaged by an infringer in a two-supplier market, and when the nexus between the sole licensee and the patentee is so clearly defined as here, the sole licensee must be recognized as the real party in interest. Furthermore, in determining that [the sole licensee] has standing to join as a co-plaintiff, we not only give effect to principles of equity, but also the Congressional mandate that, in patent actions, "upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement."

All of these factors are present here. The substance of the arrangement between NA and A/S ensured that others are excluded from practicing the patent. The "nexus" between the patentee A/S and the licensee NA is extraordinarily close. NA is the only entity allowed to practice the patent. NA, along with A/S, was directly damaged by the infringement in a two-supplier market.

NA is a wholly owned subsidiary of A/S. **A15011:3-8; 15054:9-15; A15160:25-15161:3.** NA's board is controlled by A/S. **A15014:12-15015:17; 15163:1-6**. A/S must approve all strategic decisions made by NA, ranging from the determination of NA's various budgets to the hiring and firing of factory employees. **A15010:7-15014:11, A15055:4-14, A15163:11-20**. A/S is entitled to all profits earned by Novozymes NA and controls how those profits are allocated throughout the Novozymes group of companies. **A15058:1-7; A15075:18-19**. A/S issues consolidated audited financial statements that incorporate the profits and losses of NA, and upon which the stock of A/S is publicly traded. **A15055:25-15056:21; A15058:1-11; A15163:24-15165:6; A15166:3-15167:12**.

Other than its patentee parent, NA is the sole entity permitted to practice the '031 Patent in the U.S. **A15018:23-15019:7; A15034:17-15035:7; A15039:3-8**. Consistent with the Novozymes policy of not out-licensing its core technology, A/S has not licensed the '031 or '038 patent to any other entity. ***Id.*** This lawsuit evidences Novozymes' policy to diligently monitor for infringement and use all applicable legal means to prevent infringement of its patents.

Novozymes A/S and NA together sell Liquozyme in direct competition with Spezyme Ethyl in a two-supplier market. **A15106:13-15107:2; A15180:2-14**. Genencor's sales of Spezyme Ethyl directly harm both Novozymes A/S and Novozymes NA – those sales directly result in lost profits by both Novozymes entities. **A15058:1-11, A15102:5-15104:1, A15166:3-15167:12**.

Under these circumstances, NA is effectively an exclusive licensee of A/S. They have consistently functioned in this manner, and everyone, including Genencor, has treated them this way. NA has standing as a co-plaintiff with A/S, and it should be so-ordered. *WMS Gaming*, 184 F.3d at 1361; *Textile*, 134 F.3d at 1484; *Rite-Hite*, 56 F.3d at 1552; *Kalman*, 914 F.2d at 1481-82.

None of this is changed by the use of the word. "non-exclusive" in a blanket Technology License Agreement. **A15022:19-15023:11; A15028:25-15031:11; TE240, A16028**. Such labels are not controlling; rather "what matters is the substance of the arrangement." *Textile*, 134 F.3d at 1484; *see also Ortho.*, 52 F.3d at 1032. directed to the allocation of Novozymes' tax burden between the U.S. and Denmark, i.e. between NA and A/S. The Agreement notes threshold requirements for NA to use all of the Novozymes A/S intellectual property, not the full rights to be exchanged in practice for any particular patent. **A15022:19-15023:11, A15027:6-13**. The Agreement was required and approved by both the IRS and the Danish tax authorities. **A15026:16-15027:5;A15035:8-24; A15074:10-15075:13; A15076:8-19, A15167:13-15169:7**. It gives a negotiated formula by which the consolidated profit and loss of Novozymes (i.e. of A/S and NA), can be taxed to the satisfaction of two national governments. **A15026:16-A15027:5, A15035:8-24, A15074:10-15075:13, A15076:8-19, A15167:13-A15169:7**. This document was never intended to govern the entire relationship and actual conduct within Novozymes under '031 and '038 patents – and in practice it never did so. ***Id.*; A15034:6-16.**[14]

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[14] *Poly-America, L.P. v. GSE Lining Tech., Inc.*, 383 F.3d 1303 (Fed. Cir. 2004) is inapposite. There, the patentee was an independent sister corporation of a company that was losing sales to the infringer, and had no control over the sale of the patented product or the income earned. *Poly-America, L.P. v. GSE Lining Tech., Inc.*, 2003 U.S. Dist. LEXIS 14130, at *1 (N.D. Tex. Aug. 13, 2003). The Federal Circuit relied on this distinction: "it is not clear here whether Poly-America has itself suffered lost profits from the infringement, a matter that may be dealt with on remand." *Poly-America*, 383 F.3d at 1311. Here, the course of conduct created an exclusive license, over and above the baseline non-exclusive

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Policy reasons confirm that NA has standing. Parties should be joined to adequately protect the rights of the patentee. *Kalman,* 914 F.2d at 1482. There is no reason to limit joinder, such as mistaken rights, or ambush from multiple parties in different forums with tenuous piecemeal claims. *Gayler v. Wilder*, 51 U.S. (10 How.) 477, 494-95 (1850); *A.L. Smith Iron Co. v. Dickson*, 141 F.2d 3, 6 (2d Cir. 1944). There is no confusion about who has rights to use the Novozymes inventions. There is only Novozymes, encompassing A/S and NA, jointly practicing and enforcing the '038 and '031 patents – as Genencor has always known. There is no basis to exclude NA as a party plaintiff in this case. **A15010:7-15014:11, A15055:4-14, A15160:25-15161:3, A15163:11-20.**

D. PREJUDGMENT INTEREST & COSTS

The Court should also award prejudgment interest for Novozymes' damages and costs. "An award of prejudgment interest serves to make the patentee whole because the patentee also lost the use of its money due to infringement." *Crystal Semiconductor*, 246 F.3d at 1361. There are no circumstances here that would justify the denial of prejudgment interest, such as a delay in filing suit. Suit was filed on the day the patent issued. *General Motors Corp. v. Devex Corp.*, 461 U.S. 648, 657 (1983) ("Prejudgment interest should be awarded under § 284 absent some justification for withholding such an award."); *Crystal Semiconductor*, 246 F.3d at 1346 ("the discretion of the district court in denying prejudgment interest is limited to specific circumstances"). An appropriate rate for prejudgment interest is the average of the short term prime lending rate from the date of initial infringement to the entry of judgment, compounded annually. If the Court awards damages, Novozymes requests an accounting to determine the proper amount of prejudgment interest.

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grant. Here, A/S is the 100% owner of NA, controls the manufacture and sale of Liquozyme in the U.S. and reaps every penny of the income from those sales. **A15010:7-A15014:11; A15163:7-20.** A/S consolidates the profits and losses of NA on its accounts and thus itself suffers lost profits on any lost sales of Liquozyme on a dollar for dollar basis. **A15055:25-A15056:21, A15058:1-11, A15163:24-A15165:6, A15166:3-A15167:12.**

E. GENENCOR'S INFRINGEMENT WAS WILLFUL

"The tort of willful infringement arises upon deliberate disregard for the property rights of the patentee." *Vulcan Eng'g Co. v. FATA Aluminum, Inc.*, 278 F.3d 1366, 1378 (Fed. Cir. 2002). Willful infringement "is not simply a conduit for enhancement of damages; it is a statement that patent infringement, like other civil wrongs, is disfavored, and intentional disregard of legal rights warrants deterrence." *Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp.*, 383 F.3d 1337, 1342 (Fed. Cir. 2004) (en banc). "'Where, as here, a potential infringer has actual notice of another's patent rights, he has an affirmative duty to exercise due care to determine whether or not he is infringing'" (*Id.*) (quoting *Underwater Devs., Inc. v. Morrison-Knudsen Co.*, 717 F.2d 1380, 1389-90 (Fed. Cir. 1983)). *See also Jurgens v. CBK, Ltd.*, 80 F.3d 1566, 1571 (Fed. Cir. 1996).

Willfulness is fact question, proven by clear and convincing evidence in the totality of circumstances. *John Hopkins Univ. v. Baxter Healthcare Corp.*, 152 F.3d 1342, 1363 (Fed. Cir. 1998). *See SRI Int'l, Inc. v. Advanced Tech. Labs., Inc.*, 127 F.3d 1462, 1464-65 (Fed. Cir. 1997):

> [T]he primary consideration is whether the infringer, acting in good faith and upon due inquiry, had sound reason to believe that it had the right to act in the manner that was found to be infringing. The law of willful infringement does not search for minimally tolerable behavior, but requires prudent, and ethical, legal and commercial action.

See also Vulcan Eng'g Co., 278 F.3d at 1378; *Knorr-Bremse*, 383 F.3d at 1347.

1. Genencor Acted in Deliberate Disregard of Novozymes' Patent Rights

This is a glaring case of "deliberate disregard" of patent rights to maximize profit. *Vulcan Eng'g*, 278 F.3d at 1378. Genencor was aware of the pending and issued '031 patent. It continued with Spezyme Ethyl, so it could regain dominance in the market, rather than atrophy with an inferior, less profitable product. *Applied Med. Resources Corp. v. U.S. Surgical Corp.*, 435 F.3d 1356, 1365 (Fed. Cir. 2006) (willful to continue infringing when defendant "desperately needed a universal seal trocar to remain competitive in the surgical business"); *Rosemount, Inc. v. Beckman Instruments, Inc.*, 727 F.2d 1540, 1547-48 (Fed. Cir. 1984) (defendant "knowingly, deliberately, willfully and wantonly infringed because of market pressure").

Genencor led the fuel ethanol market in the 1990s, but its sales evaporated after Novozymes launched its superior Liquozyme products in 1999. **A15180:2-15181:19; A15090:19-15094:11**. Genencor recognized that its old products were "not as good as Liquozyme" and were "not particularly well suited" for fuel ethanol production. **15181:20-185:5**; **A10024, ¶ 58**. Genencor was desperate for a new product that could compete with Liquozyme and bolster its dwindling market share. **A15181:3-19; TE-230, A16018**. It acquired EBS to gain access to other alpha-amylases. **A15371:10-23**. The EBS-1 product ran afoul of the '038 patent, and in a consent judgment EBS and Genencor agreed to withdraw it. **TE230, A16022; A15184:6-186:6; A15377:15-15378:10**. Genencor then spent over a year trying to improve its existing Fred product, without success. **A10024, ¶ 58; A5037:15-5039:11**. By August 2003, Genencor still had no competitive alternative. Its existing alpha-amylases were "hampered by technical performance and economic issues," which left the company "uncompetitive" and with "a significant gap" in the market vis-à-vis Novozymes. **TE-230, A160018, 160022**; **A15186:11-15187:3**. And so: "*We must pursue* EBS-2 development and commercialization as our *only viable short term option*." **TE-230, A160018**. It projected diverting millions in annual profits from Novozymes. ***Id.* at A16016**.

During its subsequent development of EBS-2 (Spezyme Ethyl), Genencor knew that Novozymes had a pending patent. **TE-228, A16005-06**. Genencor knew that Novozymes claimed a deletion "corresponding to the deletion present in EBS2" (so EBS-2 would infringe). In the person of Dr. Crabb, it "concluded," without anything more, that these claims would be rejected by the PTO as obvious over the Suzuki reference. ***Id.*** With no other "viable short term option," Genencor rolled the dice, began sales of Spezyme Ethyl in April 2004, and gambled that the '648 application would ultimately not issue. **TE-228, at 16006; A10023 at ¶ 57**. This gamble did not pay off. On September 21, 2004, the PTO issued a Notice of Allowance, specifically holding that the claimed invention was *non-obvious and patentable* over Suzuki based on evidence of unexpected results. **A10011-14, 10017-21, ¶¶ 26, 30-33, 42-52**. Novozymes promptly sent Genencor a letter on September 29, 2004. It enclosed a copy of the allowed claims, and told Genencor that Spezyme Ethyl would infringe. **TE-320 at 16074; A15128:18-15130:7; A15216:12-22, A15220:2-15222:1.** The '031 Patent issued five months later, on March 15, 2005. **TE-100, A7001.**

Genencor ignored this advance notice. **A5014:4-14**. It did not respond to the letter, did not discontinue Spezyme Ethyl, and did not begin developing an alternative. It presented no evidence that it sought or obtained advice of counsel on the '031 patent, or otherwise tried to discharge its "affirmative duty to exercise due care" to avoid infringement. *Knorr-Bremse*, 383 F.3d at 1343.[15]

Genencor just carried on, unabated. *Advanced Cardiovascular Sys., Inc. v. Medtronic, Inc.*, 265 F.3d 1294, 1310 (Fed. Cir. 2001) (willful infringement when defendant "controlled its own destiny" by continuing sales after patent issued and after lawsuit began); *National Presto Indus., Inc. v. West Bend Co.*, 76 F.3d 1185, 1193 (Fed. Cir. 1996) (willful infringement when defendant knew of pending application for months, plaintiff filed suit on day patent issued, and defendant continued infringing); *Golden Blount*, 438 F.3d at 1369 (willful infringement when defendant "made little-to-no effort to assess whether it infringed or whether the patent was invalid after receiving notice"); *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1339 (Fed. Cir. 2004) (willful infringement when defendant undertook no investigation after receiving cease-and-desist letter and continued to sell its inventory of infringing products).

Genencor had no objective and good-faith reason to believe, at the time the patent issued, that it was entitled to continue sales of Spezyme Ethyl. Good faith requires that a "*prudent person* would have *sound reason*" to believe that a product did not infringe or that the patent was invalid, "and *would be so held if litigated*." *Knorr-Bremse*, 383 F.3d at 1347. Genencor's litigators later developed arguments contesting liability at trial. Such arguments "are not equivalent" to activities "which qualify as 'due care' before undertaking any potentially infringing activity." *Crystal Semiconductor Corp. v. Tritech Microelecs. Int'l, Inc.*, 246 F.3d 1336, 1352 (Fed. Cir. 2001).

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[15] Genencor asserted privilege for any opinion of counsel on the '031 Patent. **A15213:20-15214:18; A15222:8-13; A15379:3-15382:13; A15391:13-15392:17**. This does not create an inference that the advice was unfavorable. *Knorr-Bremse*, 383 F.3d at 1344. Likewise, there is no inference that the advice was competent or favorable. Genencor cannot rely on assertions of privilege as evidence of due care. *L.A. Gear, Inc. v. Thom McAn Shoe Co.*, 988 F.2d 1117, 1126-27 (Fed. Cir. 1993) ("Although a party to litigation may indeed withhold disclosure of the advice given by its counsel, as a privileged communication, it will not be presumed that such withheld advice was favorable to the party's position.").

In fact, Genencor knew that Spezyme Ethyl infringed the '031 patent. For example, its VP of Applications, Mr. Crabb, admitted that Ethyl "corresponded" to the claims in the pending '031 Patent. **TE-228, A16006; A15383:3-15384:10** (same 179,180 deletions in '031 and Ethyl). Rather than try to design around these claims or otherwise avoid infringement, Genencor simply "concluded" (i.e., hoped) that the pending patent would be rejected as obvious over Suzuki. *See id.*

However, Genencor had no substantial reason to believe that the patent, once issued, was invalid. After the PTO rejected the relevant claims over Suzuki, Novozymes presented evidence of unexpected results through the Borchert declaration. The PTO then expressly held that the patent was *not obvious* over Suzuki, and it allowed the claims. **A10013-10021, ¶¶ 30-52**. Once allowed, the patent is presumed valid. 35 U.S.C. § 282. An initial rejection, followed by a subsequent allowance, "hardly justifies a good faith belief of the invalidity of the claims." *Acoustical Design, Inc. v. Control Electronics Co.*, 932 F.2d 939, 942 (Fed. Cir. 1991). Genencor placed its faith in Crabb's testimony about Suzuki and its description of similar 179,180 deletions in a different microorganism, and without more, brushed off the '031 patent. **A15389:5-15391:12**. There is no evidence that Crabb or anyone else considered the '031 allowance, the file history, and then unexpected results. No one made a diligent inquiry or a factual, technical and legal analysis to support a good-faith conclusion of invalidity. Actually, Crabb testified that he "did not do anything" after Genencor received notice of the allowed '031 claims, and that he "[did not] have any knowledge" of what anyone else had done. **A15222:16-23, A15224:7-15**. Crabb further acknowledged that he had only a lay understanding of patent law; yet no help from anyone else was relied on. **A15217:25-15218:7**. This was in the context of actual notice of '031 infringement, and litigation with Novozymes over EBS-1/Ultra-pHLo under the sister '038 patent.

Such studied ignorance and naïve belief by a lay witness falls far short of a "sound reason" for invalidity or for infringing an issued patent. *Knorr-Bremse*, 383 F.3d at 1347. *Golden Blount*, 438 F.3d at 1365 (willful infringement when attorney's opinion was based solely on assertion that "for 20 years or more, the whole industry has been making things like that"); *Rosemount*, 727 F.2d at 1548 (in-house memos by engineers that "they see nothing patentable" in plaintiff's invention failed to establish "honest

doubt" of validity and infringement). Such "bald, conclusory and unsupported remarks regarding validity" indicate bad faith. *Underwater Devs.*, 717 F.2d at 1390.

Genencor's asserted belief that the '031 patent was obvious is contradicted by its own representations to the PTO. In April 2005, Genencor filed a patent application for Spezyme Ethyl. This was *just three weeks after* the '031 patent issued and this suit was filed. **TE-100, A7001.** Genencor's claims included the same variants, with deletions of the same 179,180 residues in same *B. stearothermophilus*. **TE-202, A8532.1, A8532.44; A6538:24-6540:7**. Genencor cited Suzuki, but asserted that these variants are "more effective" and are patentable over the prior art. **TE-202, A8532.14-8532.15**. While claiming patentability in its own application, Genencor says it thought the same variants were unpatentable to Novozymes in the granted '031 patent, in view of the same prior art. This underscores that Genencor had no good faith reason to discount the '031 patent, and on the contrary, said and had reason to believe that it was valid and infringed.

Genencor continued its infringing sales of Spezyme Ethyl for as long as possible rather than switch to any non-infringing (inferior and less profitable) alternatives. At trial, Genencor asserted that it could have avoided infringement by developing Spezyme Xtra by March 2005. **A15401:21-15403:2**. But Genencor did not begin on Xtra until June or September of 2005. **A15193:19-15194:21**. It knew that Xtra had poor performance and would cost "substantially higher" than Ethyl. A $9.8 million loss was projected. **A15203:11-15205:13; TE-298, 16068; A15195:22-15197:22; TE-447, A16232**. Genencor only developed the less-than Xtra as its last resort "contingency plan" and did not begin sales in earnest until after the Court found against Spezyme Ethyl. **TE-447, A16232; A15194:22-25; A15403:11-14**. It also did not switch customers to Spezyme Fred. In short, Genencor decided to continue selling as much Spezyme Ethyl as it could for as long as possible, to maximize its profits. *See Applied Med.*, 435 F.3d at 1365 (affirming willfulness where defendant only began developing non-infringing product in response to possible injunction); *Avia Group Int'l, Inc. v. L.A. Gear California, Inc.*, 853 F.2d 1557, 1566-67 (Fed. Cir. 1988) (affirming willfulness where defendant had "intentionally accepted the risk of infringement" by continuing infringing sales after patent issued and lawsuit was filed); *Knorr-Bremse Systeme Fuer*

Nutzfahrzeuge GmbH v. Dana Corp., 372 F. Supp. 2d 833, 847 (E.D. Va. 2005) (opinion after remand) (where a party "continues to engage in infringing behavior until a modified product is ready for distribution, a finding of willful infringement is warranted").

Novozymes presented at least "threshold evidence of culpable behavior," which shifted the burden shifts to Genencor "to put on evidence that it acted with due care." *Golden Blount,* 438 F.3d at 1368. It failed to do so. It offered only two superficial and irrelevant arguments: (1) that it had acted with good faith concerning the '038 patent, and (2) a preliminary injunction was denied.

First, Crabb testified that Genencor "took great care" to avoid infringement of the separate '038 patent. **TE-228, A16007**; **A15211:6-16**. That patent has entirely different claims than the '031 patent. Genencor cannot assert good-faith reliance on an *irrelevant opinion of counsel* concerning a different patent, while asserting privilege with respect to any opinions concerning the actual '031 patent-in-suit. *Advanced Cardiovascular Sys., Inc. v. Medtronic, Inc.*, 265 F.3d 1294, 1309 (Fed. Cir. 2001) ("no logical connection between its receipt of the earlier opinions [concerning non-infringement of other patents] and its intent with regard to the [patent-in-suit]."). This further supports that the '031 patent was deliberately disregarded. *Golden Blount*, 438 F.3d at 1369 (reaffirming that reliance on incompetent opinions is evidence of bad faith).[16]

Second, Genencor relies on the Court's Order of October 26, 2005, which denied Novozymes' motion for a preliminary injunction. **A15391:10-15393:7**. This was more than *seven months after* Genencor began its infringement. It has no bearing on Genencor's asserted good faith as of March 2005, when the patent issued. *Knorr-Bremse*, 383 F.3d at 1343 (good faith requires diligence "*before* the initiation of any possible infringing activity"); *John Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1362-63, 1365 (Fed. Cir. 1998) (defendant's "temporary victory" during litigation "has no bearing" on good

[16] As above, Crabb also said that Genencor believed the pending '031 Patent would be rejected by the PTO as obvious. **A15211:17-212:10; TE- 228, A16006**. However, once the '031 Patent *did in fact issue* in March 2005, Genencor then had a duty to act with due care to avoid infringement. *National Presto*, 76 F.3d at 1193. Genencor could no longer rest on an incorrect assumption that the patent would be rejected. *Acoustical Design*, 932 F.2d at 942.

faith when defendant began its infringement). Moreover, the Court found only that substantial issues existed for trial, *not* that the patent *would likely be held* invalid. *Hoechst Celanese Corp. v. BP Chems. Ltd.*, 78 F.3d 1575, 1584 (Fed. Cir. 1996) (affirming willfulness notwithstanding parallel finding of a "substantial new question" of patentability by the PTO, because that finding "does not establish a *likelihood* of patent invalidity").

Genencor did not act with due care, discounted Novozymes' rights, and willfully infringed.

2. The Court Should Award Treble Damages for Willful Infringement

The Court may award up to treble damages for willful infringement. 35 U.S.C. § 284. "In exercising this discretion, the trial court considers the weight of the evidence of the infringer's culpability in light of the factors included in *Read*." *John Hopkins Univ.*, 152 F.3d at 1365 (citing *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 827 (Fed. Cir. 1992)). "The paramount determination in deciding to grant enhancement and the amount thereof is the egregiousness of the defendant's conduct based on all the facts and circumstances." *Read*, 970 F.2d at 826. The following *Read* factors support a full award of treble damages.

Genencor deliberately copied Novozymes' ideas. It knew that Spezyme Ethyl was being patented by Novozymes. Indeed, Genencor went from EBS-1, a Liquozyme knockoff, to EBS-2 a "me too" under the '031 patent. **TE-230, A16022; A15184:6-186:6; A-10040, ¶38**. Genencor did not duly investigate the patent and had no good-faith basis for a belief of invalidity or non-infringement. **A15383:3-15384:10; TE-228, A16006**. Genencor was motivated to infringe, and intended the harm that occurred, because of its pressing desire to reclaim the fuel ethanol market at any cost. It was in a two-supplier market with Novozymes, and knew that any sales it gained would come from Novozymes. **A15222:16-23, A15224:7-15**. Genencor continued to infringe during the litigation, and took no remedial action when it says it could have. **A15193:19-15194:21**. Nor was the litigation particularly close. Genencor did not have a substantial defense of non-infringement. Its primary arguments were inequitable conduct and that the patent was obvious over Suzuki and Machius. The PTO expressly considered Suzuki, the allegations of inequitable conduct and bogus unexpected results were baseless, and Machius was cumulative. **A10055-56**. Genencor

also skirted the line on privilege. It sought to maintain the privilege as to the '031 Patent while trying to imply that it had received favorable advice. **A15379:3-15382:13; A15391:13-15392:17; TE-228, A16005-06**. Finally, Genencor is a major company owned by the Danish company Danisco, **(DI184, A-16)** and can afford to pay treble damages; it will not be crippled or put out of business.

The Court should enhance damages based on the flagrant nature of Genencor's infringement. The amount is discretionary; treble damages would be appropriate.

3. The Court Should Award Novozymes its Reasonable Attorneys Fees

This case is exceptional because of Genencor's egregious willful infringement. It knowingly pushed an infringing product and risked litigation, rather than make diligent inquiry or take reasonable steps to avoid infringing. Novozymes should recover its attorneys fees for having to defend its patent rights in these circumstances. 35 U.S.C. § 285; *Golight,* 355 F.3d at 1339-40.

F. NOVOZYMES IS ENTITLED TO A PERMANENT INJUNCTION

A patent grants its owner a right to exclude others from the patented invention. 35 U.S.C. § 283. An injunction is the means by which this right is enforced. *Hybritech Inc. v. Abbott Labs.,* 849 F.2d 1446, 1456-57 (Fed. Cir. 1988). Novozymes' motion for a permanent injunction is pending and should now be granted. **DI 169**.

eBay Inc. v. MercExchange, L.L.C., 126 S. Ct. 1837, 1839 (2006) delineated four familiar predicates for an injunction: (1) irreparable harm; (2) inadequacy of legal remedies; (3) balance of hardships; and (4) public interest. The presumption of harm is embedded in this test. *Abbott Labs. v. Andrx Pharms., Inc.*, 452 F.3d 1331, 1348 (Fed. Cir. 2006); *Polymer Technologies, Inc. v. Bridwell*, 103 F.3d 970, 973 (Fed. Cir. 1996); *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1247 (Fed. Cir. 1989). *eBay* does not do away with injunctions in patent cases, nor provide compulsory licensing of patents to infringers. It simply says that an injunction is not automatic.

Here, the irreparable harm went beyond the presumption Novozymes earned, and money alone cannot fix it. *eBay*, 126 S. Ct. at 1839; *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1247 (Fed. Cir. 1989). The principal value of a patent is exclusivity, which money does not address. *Hybritech,* 849 F.2d

at 1456-57. Money for past losses does not address on-going residual harm, nor threat of future injury. Genencor transformed the market by infringement. It lowered prices, eroded market share, and created an anti-Novozymes climate that will be hard to reverse. *Purdue Pharma L.P. v. Boehringer Ingelheim GMBH,* 237 F.3d 1359, 1368 (Fed. Cir. 2001); *Polymer Techs., Inc. v. Bridwell,* 103 F.3d 970 (Fed. Cir. 1996). This includes a loss of good will and damage to reputation for innovation. *Bio-Tech. Gen. Corp. v. Genentech, Inc.* 80 F.3d 1553, 1566 (Fed. Cir. 1996); *Fisher-Price, Inc. v. Safety 1st, Inc.*, 279 F. Supp. 2d 526, 528 (D. Del. 2003); *Solarex Corp. v. Advanced Photovoltaic Sys. Inc.*, 34 U.S.P.Q.2d 1234, 1240 (D. Del. 1995).

The hardship tips heavily for Novozymes. *eBay*, 126 S. Ct. at 1839. An injunction would ensure as much of a return to pre-infringement as possible. It will secure jurisdiction against future problems, with a way to resolve them, e.g. a motion for contempt. No restraint on Genencor would invite more harm and encourage encroachment by others. There will be no harm to Genencor from an order to forbear. *Windsurfing Int'l, Inc. v. AMF, Inc.,* 782 F.2d 995, 1003 n.12 (Fed. Cir. 1986) ("One who elects to build a business on a product found to infringe cannot complain").

Genencor claims it has withdrawn Spezyme Ethyl but makes no pledge for the future. At trial, it carefully spoke only about what it "currently" plans. **A15420:20-15422:11**. Infringement continues as customers use up their stock. Genencor has yet to gauge market reaction to the loss of this infringing supply. **A15530:24-15531:13**. "The fact that the defendant had stopped infringing is generally not a reason for denying an injunction against future infringement," 7 Ernest Bainbridge Lipscomb III, Lipscomb's Walker on Patents § 25:35 (3d ed. 1988). "The argument in such circumstances is very simple. If the defendant be honest in his protestations, an injunction will do him no harm; if he be dishonest, the court should place a strong hand upon him." *W.L. Gore & Associates, Inc. v. Garlock, Inc.,* 842 F.2d 1275, 1282 (Fed. Cir. 1988).

Policy also favors an injunction. The public interest is best served by the protecting patent rights. *H.H. Robertson v. United Steel Deck, Inc.*, 820 F.2d 384, 391 (Fed. Cir. 1987); *Solarex,* 34 U.S.P.Q.2d at 1241. No public interest that would be injured. *Hybritech*, 849 F.2d at 1458.

III. CONCLUSION

For all of the reasons given, the Court should enter judgment: (1) entering a permanent injunction against Genencor, the infringing Spezyme Ethyl product, and any infringement of the '031 patent; (2) ordering Genencor to pay money damages to Novozymes in the amount of $20,365,465 plus pre-judgment interest; (3) ordering Genencor to pay enhanced damages for willful infringement by trebling the money damages; (4) ordering Genencor to pay Novozymes its reasonable attorneys fees for prosecuting this litigation in light of Genencor's willful infringement; and (5) ordering that Novozymes North America be added as a party-plaintiff to this action.

Respectfully submitted,

Dated: November 17, 2006

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CERTIFICATE OF SERVICE

I, Andrew A. Lundgren, hereby certify that on November 17, 2006, I caused to be electronically filed a true and correct copy of the foregoing document with the Clerk of the Court using CM/ECF, which will send notification that such filing is available for viewing and downloading to the following counsel of record:

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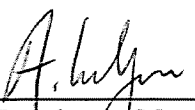

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